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The International Atomic Energy Agency (IAEA) is currently seeking a sensor technology which can help in verifying that nuclear material is not diverted from peaceful uses to nuclear weapons or other nuclear explosive devices in accordance with non-proliferation treaty commitments. Currently, IAEA safeguard equipment does not have a portable analytical instrument able to identify several materials used in the refining and the production of nuclear fuel. Consequently, the verification is performed by taking samples from sites and sending them to the Safeguard Analytical Laboratory (SAL) of the IAEA in Vienna for characterization and analysis. This procedure is expensive and time consuming. Therefore, the Canadian Nuclear Safety Commission (CNSC-CCSN), in their IAEA support mandate, is currently evaluating Laser-Induced Breakdown Spectroscopy (LIBS) as a technology for safeguard applications. The LIBS technique has several advantages toward this application, the most relevant being that the measurement can be performed in real time, the contact with the sample is not necessary, and the analysis can be made at a distance, thus avoiding contamination from radioactive materials. In this presentation, we will report the results obtained for the discrimination of materials involved in the nuclear industry such as processed uranium (known as yellowcake), maraging steel, aluminum alloys, magnesium alloys, zirconium alloys, and borosilicate glass and also on the enrichment of the uranium. Our results indicated that it is possible to quickly identify the origin of uranium (i.e. yellowcake) using pattern recognition chemometric procedures. In addition, the isotopic enrichment of uranium can be predicted using LIBS emission spectra obtained from a portable instrument configuration.